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The Effect of Couples Intervention to Increase Breast Cancer Screening Among Korean Americans

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Abstract

Purpose/Objectives—To assess the efficacy of Korean Immigrants and Mammography—Culture-Specific Health Intervention (KIM-CHI), an educational program for Korean American (KA) couples designed to improve mammography uptake among KA women.

Design—A two-group cluster randomized, longitudinal, controlled design.

Setting—50 KA religious organizations in the Chicago area.

Sample—428 married KA women 40 years of age or older who had not had a mammogram in the past year. The women and their husbands were recruited from 50 KA religious organizations.

Methods—Couples were randomly assigned to intervention or attention control groups. Those in the KIM-CHI program (n = 211 couples) were compared to an attention control group (n = 217 couples) at baseline, as well as at 6 and 15 months postintervention on mammogram uptake.

Main Research Variables—Sociodemographic variables and mammography uptake were measured. Level of acculturation was measured using the Suinn-Lew Asian Self-Identity

Acculturation Scale. Researchers asked questions about healthcare resources and use, health insurance status, usual source of care, physical examinations in the past two years, family history of breast cancer, and history of mammography.

Findings—The KIM-CHI group showed statistically significant increases in mammography uptake compared to the attention control group at 6 months and 15 months postintervention.

Conclusions—The culturally targeted KIM-CHI program was effective in increasing mammogram uptake among nonadherent KA women.

Implications for Nursing—Nurses and healthcare providers should consider specific health beliefs as well as inclusion of husbands or significant others. They also should target education to be culturally relevant for KA women to effectively improve frequency of breast cancer screening.

Keywords

breast cancer; clinical trials; mammography; Korean American; prevention; detection

Breast cancer is the leading cancer among Korean American (KA) women (Miller, Chu, Hankey, & Ries, 2008). The incidence of breast cancer in all Asian women, including KA women, has been much lower than for Caucasian women in the United States. However, the incidence noticeably increases as the length of residence in the United States increases, a phenomenon that is potentially related to adopting a more Western lifestyle (Deapen, Liu, Perkins, Bernstein, & Ross, 2002; Ursin et al., 1999). Invasive breast cancer among KA women almost doubled from 1988 (26 per 100,000 women) to 1997 (45 per 100,000 women), but the rates for African American and Hispanic populations remained about the same (Deapen et al., 2002).

Literature Review

Although the American Cancer Society ([ACS], 2014) recommends that women aged 40 years or older receive a mammogram every year, only 22%–39% of KA women reported having a mammogram in the past year (Choi et al., 2010; Lee, Fogg, & Sadler, 2006; Wu & West, 2007), and 34%–57% of KA women reported having one in the past two years (Juon, Kim, Shankar, & Han, 2004; Lee et al., 2006; Lee, Ju, Vang, & Lundquist, 2010). Those rates are far below the mammography screening rates for all other ethnic groups in the United States, which ranged from 63%–68% (Centers for Disease Control and Prevention [CDC], 2012). The U.S. Preventive Services Task Force ([USPSTF], 2009) recommends mammography every other year for women aged 50 years or older. Many organizations, including the National Cancer Institute and National Institutes of Health, have acknowledged the USPSTF guidelines but have not endorsed them. Because those new guidelines do not have widespread support, the authors chose to follow ACS's recommendation of annual mammography screening for women aged 40 years or older for the current study.

The increase in breast cancer rates among KA women coupled with low screening rates suggest the need for effective, culture-specific interventions, but little scientific evidence exists that supports any widespread adoption of such programs. Studies of KA and Asian

American women in general show the influence of health beliefs on breast cancer screening behaviors (Eun, Lee, Kim, & Fogg, 2009; Lee, Tripp-Reimer, Miller, Sadler, & Lee, 2007; Lee, Kim, & Han, 2009; Suh, 2006, 2008). For example, most KA women believe they are not susceptible to breast cancer if they breastfed their children and do not have a family history of breast cancer (Lee et al., 2007).

Family members also influence KA women's health behaviors (Han, Williams, & Harrison, 2000; Im, Lee, & Park, 2002; Im, Meleis, & Lee, 1999; Lee et al., 2007). KA women who received support and encouragement from family members to get a mammogram were about four times more likely to receive one than those who did not receive encouragement (Han et al., 2000). In addition, KA women who were married to non-KA men reported receiving more support and were more likely to practice frequent breast self-examination (BSE) than women who were married to KA men (Han, Williams, & Harrison, 1999). Those results suggest that spouses of KA women may be less likely to provide support for breast cancer screening behaviors, and they may be a deterrent to getting a mammogram. An intervention including married couples in Korea demonstrated a significant improvement on BSE (Park, Song, Hur, & Kim, 2009). Those findings suggest that interventions for mammography screening incorporating KA women's family members or spouses may be more effective than interventions focusing only on individual health beliefs. However, no published intervention studies with KA women incorporate those vital interpersonal factors (Han, Lee, Kim, & Kim, 2009; Juon, Choi, Klassen, & Roter, 2006; Kim & Menon, 2009; Kim & Sarna, 2004; Moskowitz, Kazinets, Wong, & Tager, 2007; Wismer et al., 2001).

Interventions using videos incorporating people of the same ethnicity and with similar health beliefs and behaviors as the target audience are considered culturally and linguistically appropriate, and they can effectively increase the targeted audience's knowledge, attitudes, and adherence to recommended health behaviors (Wong, Lawrence, Struthers, McIntyre, & Friedland, 2006). Studies using video interventions have demonstrated improved breast cancer screening rates for other ethnic minorities and older populations, but no studies using video interventions have been performed with KA women (Goel, Gracia, & Baker, 2011; Taylor et al., 2002; Wang et al., 2008; Wang, Schwartz, Luta, Maxwell, & Mandelblatt, 2012; Wood & Duffy, 2004; Yancey, Tanjasiri, Klein, & Tunder, 1995).

Intervention Framework

For the current study, the authors developed a Korean-language film in DVD format, featuring the Korean Immigrants and Mammography—Culture-Specific Health Intervention (KIM-CHI) program. KIM-CHI was designed to change nonadherent KA women's culture-specific beliefs and improve spousal support to promote adherence to mammography screening. The framework that guided the development of KIM-CHI for the current study was drawn from the health belief model (HBM) (Becker, 1974; Champion & Skinner, 2008) and supplemented by Kleinman's (1980, 1987) model of illness and spousal support. HBM notes that women will take action to have a mammogram (a) if they perceive themselves as susceptible to a condition (perceived susceptibility), (b) if they believe the consequences are serious (perceived seriousness), (c) if they believe a mammogram would be beneficial in reducing their susceptibility or the severity of the condition (perceived benefits), and (d) if

they believe that the tangible and psychological costs of their mammogram (perceived barriers) are outweighed by its benefits (Champion & Skinner, 2008). Kleinman's (1980, 1987) explanatory model of illness asserts that beliefs associated with an illness tend to be linked with culturally influenced psychological and social characteristics. Because women in similar cultural groups often share common knowledge, beliefs, and attitudes that are fundamental to their health behaviors, the culture-specific context should be considered essential to every variable and integrated into the overall framework. KIM-CHI content included an overlay of cultural context (Menon, 2012). The blended framework accentuated the multidimensional nature of health behavior change and placed an emphasis on individual, societal or familial, and cultural factors.

The current study reports the results of the first randomized, clinical trial to compare the outcome of having a mammogram after participating in the KIM-CHI program to an attention control group that received education about improving diet. The primary hypothesis was that women in the KIM-CHI group would have a significantly higher mammogram uptake at 6 and 15 months postintervention, when compared to women in the attention control group.

Methods

Design

In this two-group cluster randomized, longitudinal, controlled trial, the authors delivered the KIM-CHI and control activities to women and their spouses immediately after baseline data collection. Couples were recruited from 50 KA religious organizations. Participants in the attention control group followed the same study procedures as participants in the KIM-CHI group, with the exception of the content of the educational films. Baseline and longitudinal data were collected from August 2008 to September 2010.

Setting

Data were collected from KA women and their spouses who belonged to KA religious organizations located in Cook County, IL. A religious organization setting was chosen to recruit participants for the study because 70%–95% of the KAs in the authors' previous research samples and KA women in other published studies have identified themselves as Christians (Jo, Maxwell, Yang, & Bastani, 2010; Lee et al., 2006; Min & Kim, 2005). That setting enabled access to the greatest number of KA couples. Of the 50 religious organizations that served as recruitment sites, 45 were Protestant, 3 were Catholic, and 2 were Buddhist.

Sample

Participants in the study were first-generation KA immigrants. Women in the study were aged 40 years or older, born in Korea, fluent in speaking and reading Korean, and married to a KA man who was born in Korea and fluent in speaking and reading Korean. Women who had a mammogram within the past year or had been diagnosed with breast cancer were excluded. A total of 516 women were assessed for eligibility from August 2008 to June 2009, and the authors recruited 428 KA women at baseline.

Using G*Power, version 3, the authors calculated an *a priori* sample of size 400 (200 per study group) based on detecting a 10% difference in the primary outcome (i.e., mammogram completion) between the KIM-CHI and control groups with 90% power and a modified alpha of 0.005 to account for 10 multiple comparisons (Faul, Erdfelder, Lang, & Buchner, 2007). During data analysis, the authors observed power at 0.98 for detecting a 15% difference in mammography uptake after controlling for associated covariates at an adjusted alpha of 0.007.

Intervention

The KIM-CHI group slogan was “Healthy Family, Healthy Wife,” and the control group slogan was “Healthy Family, Healthy Diet,” emphasizing the importance of the husband’s support in promoting family health by encouraging breast cancer screening or healthy diet in the KIM-CHI and attention control groups, respectively. The KIM-CHI program consisted of showing a project team–designed 30-minute Korean-language DVD on breast cancer screening to change health beliefs and improve spousal support, holding a brief group discussion session immediately after the video, and requiring each couple to complete a discussion activity at home to enhance spousal support.

A Korean-owned media firm guided the research team through professional production of the DVD. The KIM-CHI film ends with the slogan, “As most Koreans have a habit of eating kimchi every day, Korean women should have a habit of getting a mammogram every year.” Kimchi is a traditional Korean fermented dish consisting of vegetables with varied seasonings, commonly eaten with almost every meal and a deliberate acronym for the intervention. Intervention messages in the DVD were designed around KA cultural values that the authors identified in previous studies with KA women. The Korean-language DVD addressed facts about breast cancer and recommendations for breast cancer screening, culture-specific beliefs that most likely prevent KA women from receiving screening, examples of support provided by the spouse for their wives’ cancer screening use, and a recommendation for screening from a male KA physician. A male KA physician was used in the DVD to convey that receiving screening is important and reduce KA women’s feelings of embarrassment regarding talking to male physicians about breast cancer.

The second component of the group discussion was guided by PowerPoint® presentations and emphasized the main messages, answered questions, and assisted in translating information into practical support for the women. The group discussion lasted about 10 minutes.

The last component of the intervention was a discussion activity aimed at increasing support provided by KA husbands for their wives. Within 24 hours of participating in the study at the religious organization, each couple was asked to complete a homework discussion activity together at home. To prove that the wife and husband discussed the homework together, the participants wrote down answers to two questions. The first question asked each to write at least two thoughts she or he had about breast cancer screening as a result of the DVD and group discussion. The second question asked them to discuss and record two things that a husband could do to be supportive of his wife’s breast cancer screening. A stamped envelope was provided to return the homework within 24 hours.

Training Research Specialists

A total of 10 social workers from one of the largest KA community agencies in the Chicago area were recruited as research specialists (RSs) for this study. They were assigned to the intervention (KIM-CHI) or attention control (healthy diet) group to obtain consent, collect data, and present education for the study at the religious organizations. All of the RSs had master's degrees in social work and were oriented for one full day prior to launching the study; they also attended weekly meetings with the research team to ensure delivery of the education materials in a standardized manner. Each group of RSs that delivered the content met separately for the orientation and training sessions to prevent any contamination. They were also instructed not to discuss the project with RSs from different groups until the project was completed. Five new RSs who were hired from the KA community to collect 6- and 15-month postintervention data via telephone were blinded to study group assignment. They also had a one-day orientation and ongoing supervision for collecting data.

Measures

Data were collected to measure mammography uptake at 6 and 15 months postintervention. Sociodemographic information, healthcare access, and history of mammography use also were measured as predictors of the outcome. Screening intervention effects tend to peak at 6 months, and the 15-month checkpoint allows for time to see a physician for referral, make an appointment, and have a mammogram.

Sociodemographic variables included age, education level, employment status, and level of acculturation. Level of acculturation was measured by the **Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA)**, which is widely used and has an internal consistency reliability of 0.75–0.91 with established concurrent and construct validity (Suinn, Ahuna, & Khoo, 1992; Suinn, Khoo, & Ahuna, 1995). The SL-ASIA includes 21 items measuring language (4 items), identity (4 items), friendships (4 items), behaviors (5 items), generational and geographic background (3 items), and attitudes (1 item). Scores ranged from 1–5, with a higher score indicating greater acculturation. An item asking about generation was deleted because all participants were first-generation KAs, and the words "Asian" and "Oriental" in the original instrument were changed to "Korean," which is a common practice when using specific Asian subgroups (Menon, Szalacha, & Prabhughate, 2012).

Researchers asked questions about healthcare resources and use; health insurance status; usual source of care (i.e., a regular clinic or primary care physician); and physical examinations in the past two years, excluding visits for sickness or health problems. Family history of breast cancer and history of mammography also were measured.

Procedures

After institutional review board approval from the University of Illinois at Chicago, 210 KA religious organizations were invited, and 100 were able to be contacted. Of those, 32 were ineligible and 18 of the remaining 68 refused to participate. The remaining 50 organizations were randomly assigned to the KIMCHI or attention control group. The authors chose to

randomize at the organizational level rather than the individual level to avoid the high risk of contamination between couples belonging to the same organization.

The study was announced in the church newsletter, and the religious leader made an announcement during the service. The authors recruited couples on a Sunday at each KA religious organization immediately following worship services. The couples were screened by the RSs and provided informed consent in a designated room. Each participant completed a self-administered questionnaire asking demographic information, healthcare access, and mammography history, which took 30–45 minutes to complete. After completing the questionnaire, the couples participated in the KIM-CHI or control education. Blinding of team members delivering the educational programs was not possible because of the content of each program.

Data Analysis

All statistical analyses were performed using SPSS®, version 19.0, and SAS®, version 9.2. Descriptive data analyses were performed using means with standard errors (SEs) for continuous variables and proportions for categorical and binary variables. Differences in demographic variables between women in the KIM-CHI and attention control groups were measured using chisquare tests for binary and categorical variables and t tests for continuous variables.

The effect of clustering of KA religious organizations in mammography uptake was calculated by the intraclass correlation coefficient (ICC). The ICC was used to assess consistency in the outcomes among the religious organizations. The design effect was 1; because it was lower than 2 (Muthén & Satorra, 1995), the data analyses could use methods for a simple random sample. The authors conducted an intent-to-treat analysis to assess the intervention effect of the KIM-CHI program.

The likelihood of having a mammogram at 15 months postintervention was predicted using logistic regression models. Separate models were fit with each sociodemographic characteristic as a predictor of the outcome. Associated, unadjusted odds ratios and 95% confidence intervals (CIs) were obtained. A final predictive model was built by including characteristics that were significant at the 0.1 level in the individual models. Adjusted odds ratios (AORs) and CIs were obtained. Two-way interactions of all variables in the final model were assessed for significance. The goodness of fit of the model was checked by the Hosmer-Lemeshow test and receiver operating characteristic (ROC) curves.

Findings

A total of 428 couples participated in the current study; 211 wife-husband dyads from 26 organizations were in the KIM-CHI intervention, and 217 wife-husband dyads from 24 organizations comprised the attention control group. Of 428 women who participated in the program at baseline, 414 women completed the telephone survey at 6 months postintervention, with 3% lost to follow-up. At 15 months postintervention, 395 women participated in the telephone survey, with a total of 8% lost to follow-up for the entire study period. No difference existed in the rate of loss to follow-up between intervention and

control groups. The reasons for loss to follow-up were death, refusal to participate, or unable to contact. KA women who completed the 15-month data collection point (n = 395) and those who dropped out (n = 33) did not differ in demographic or other major variables.

Sample Characteristics

The average age of the women who participated was 53 years (SE = 0.47), 58% had at least a high school education, and 63% were employed (see Table 1). No statistically significant differences existed between the intervention and control groups with regard to sociodemographic variables, with the exception of employment status. In the KIM-CHI group, 62% of the women were employed, compared to 64% of the women in the control group ($\chi^2 = 4.13$ [df = 1], $p < 0.05$).

Statistically significant differences also did not exist between the intervention and control groups for healthcare access and history of mammography uptake. Overall, slightly more than half of participants had health insurance, had a usual source of care, and had received a physical examination without symptoms in the past two years. About 25% of the women had never had a mammogram, 37% had received their last mammogram more than two years prior to the study, and 33% had received their last mammogram between one and two years prior to the study.

Mammography Uptake

The KIM-CHI group showed a significant increase in mammography uptake over the control group at 6 and 15 months postintervention (see Table 2).

The AORs representing the relationship between group sociodemographic characteristics and mammography uptake at 15 months are presented in Table 3. After controlling for sociodemographic factors, three significant predictors of mammography existed, including being in the KIM-CHI group (AOR = 2.04, 95% CI [1.26, 3.31]), having a source of usual care (AOR = 3.53, 95% CI [1.93, 6.44]), and history of mammograms. In particular, the KIM-CHI group was twice as likely to get a mammogram within 15 months than the attention control group. KA women who had a usual source of care were 3.5 times more likely to achieve mammography uptake within 15 months compared to those who did not have a usual source of care. In addition, women who reported having received a mammogram in the past two years were about three times more likely to get a mammogram within 15 months than those who had never had a mammogram (AOR = 2.71, 95% CI [1.41, 5.18]). Area under the curve of the associated ROC curve was 0.73, and the Hosmer-Lemeshow goodness of fit statistic ($\chi^2 = 5.55$ [df = 8], $p = 0.7$) indicated good model fit.

Discussion

To the authors' knowledge, the current study is the first reported randomized, clinical trial of a culture-specific intervention for KA women's mammography uptake. The KIM-CHI program included spouses of KA women, drawing on the importance of interpersonal context in Korean culture. Because women in the KIM-CHI group were more than twice as likely to have a mammogram after receiving the intervention at 15 months demonstrates the efficacy of the intervention to increase mammography use among nonadherent KA women.

However, the authors are not certain how spousal support increased mammography use. The authors theorize that spousal support motivated women to learn about cancer screening, assisted them in overcoming barriers, or changed their perceptions of susceptibility, seriousness, and benefits. KA women traditionally have been raised to put their family members' needs in front of their own (Im et al., 2002). Therefore, the authors' intervention aimed to emphasize the importance of maintaining wellness to better care for their families. KA women need to hear from their families, particularly their husbands, that resources such as time and finances should be used for disease prevention, not just for disease treatment.

According to the theoretical model, the authors found that the culturally targeted intervention was effective in improving mammography uptake in KA women. Intervention content focused on variables commonly known to affect mammography use (i.e., perceived susceptibility, seriousness, benefits, barriers, and spousal support). Messages relating to those constructs were included in the DVD. The authors aimed to assess whether the intervention successfully increased mammography use among KA women. In subsequent analyses, the authors will focus on assessing how those perceptions changed from baseline to postintervention, as well as whether such changes were statistically significant and predicted or mediated screening behavior. In-depth understanding of the variables manipulated through the intervention will allow for a more streamlined approach for dissemination of the intervention to community clinical practice.

To the best of the authors' knowledge, the current study is the first to examine the relationship between mammography history (i.e., received a mammogram in the past one to two years, greater than two years ago, or never) and postintervention mammogram completion among KA women. As expected, women who had a mammogram in the past one to two years were 2.7 times more likely to have had a mammogram during the study period when compared to women who had never had a mammogram. That finding underscored the importance of targeting education for KA women who were never screened (27% of the overall sample). Women older than age 40 who have never had a mammogram may need more intensive education.

None of the demographic variables predicted mammography uptake. Among the healthcare access variables, having a usual source of care was the strongest predictor for mammography uptake. A lack of studies using breast cancer screening intervention with KA women makes it difficult to compare findings from the current study with other studies. However, the KIM-CHI program was potentially powerful enough to overcome the effect of variables (e.g., age, education) that were shown in previous descriptive studies with KA women to be negatively related to mammography uptake (Juon, Choi, & Kim, 2000; Juon et al., 2004; Choi et al., 2010; Lee et al., 2006; Maxwell, Bastani, & Warda, 2000). Because 46% of the overall sample did not report having a usual source of care, and almost 40% did not have health insurance at baseline, interventions urging KA women to find a consistent source of care could improve mammography screening.

Limitations

The current study has limitations that should be considered in future studies on breast cancer screening interventions with KA women. The participants all were married to Korean

husbands and lived in the Chicago area. The KIM-CHI program could have different effects among women who are not married or are married to non-Korean husbands. Results also may be different with KAs living in other parts of the United States. The authors used multiple strategies in the KIM-CHI program (i.e., film viewing, group discussion, and homework activity) that made it difficult to attribute the outcomes to specific parts of the intervention. Future studies should test the effectiveness of specific intervention components. In particular, researchers should focus on comparing changing beliefs as well as increasing spousal support.

Implications for Nursing

A culture-specific intervention using a Korean-language DVD targeting KA couples was effective in increasing mammogram use among KA women. A significant aim of the intervention was to provide and emphasize appropriate information to rephrase KA women's common beliefs. Examples of those beliefs include, "No screening is needed if they don't have symptoms," or, "Women who don't have family history of breast cancer would not get breast cancer." Intervention messages included, "If you have symptoms, it could be too late to get screened," and, "Studies showing only one-fourth of women who were diagnosed with breast cancer had a family history, so you cannot be sure you will not get breast cancer because of a lack of family history." Nurses in community health and primary care settings should incorporate culturally targeted education instead of generic education. Given the success of the KIM-CHI program, nurses should consider specific health beliefs and social support systems (e.g., spouses) when educating patients. The DVD format could easily be used to educate KA women in community settings (e.g., clinics, community agencies). Nurses could potentially adjust the KIM-CHI education model for use with women of other ethnicities.

Knowledge Translation

Using culture-specific context, such as educating spouses, may improve breast cancer screening and mammography use among Korean American women.

A community-based, culturally responsive health promotion program delivered in a familiar and safe setting could be an effective and efficient strategy to improve health behaviors.

A culturally targeted DVD to educate at-risk minority populations could be an efficient and effective way to increase mammography screening.

The KIM-CHI program included educating KA women's husbands to be aware of the importance of annual mammograms and encourage their wives to make appointments. KA women may need to be reminded by and receive support from their husbands for breast cancer screening because KA women tend to sacrifice their own needs to prioritize taking care of their families. Therefore, healthcare providers should consider including spouses when educating KA women about breast cancer screening. Healthcare providers should be aware that KA women who do not have a usual source of care or have not had recent

mammograms are far less likely to be screened and require more individualized attention to change their health behaviors.

Conclusion

The KIM-CHI program was effective in improving mammography uptake among nonadherent KA women at 6 and 15 months postintervention. In future research, cost effectiveness of the intervention's short- and long-term impact should be investigated. Overall, the authors found that to improve breast cancer screening behavior, KA women need to be educated within the context of their cultural beliefs and environment about the importance of taking care of their health by getting regular mammograms.

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Table 1

Baseline Characteristics of Korean American Women (N = 428)

	Overall		Control (n = 217)		Intervention (n = 211)		
Characteristic	**$\bar{X}$**	**SD**	**$\bar{X}$**	**SD**	**$\bar{X}$**	**SD**	**p**
Age (years)	53.18	9.68	53.84	9.99	52.5	9.25	0.15
Acculturation	2.02	0.2	2.02	0.3	2.01	0.28	0.87

Characteristic	**n**	**%**	**n**	**%**	**n**	**%**	**p**
High school degree							0.85
Yes	247	58	128	59	119	56	
No	175	41	89	41	86	41	
Missing data	6	1	–	–	6	3	
Employed							0.04
Yes	268	63	138	64	130	62	
No	113	26	71	33	42	20	
Missing data	47	11	8	4	39	18	
Health insurance							0.1
Yes	220	51	130	60	90	43	
No	153	36	77	35	76	36	
Missing data	55	13	10	5	45	21	
Usual source of care							0.45
Yes	231	54	121	56	110	52	
No	195	46	95	44	100	47	
Missing data	2	1	1	1	1	1	
Physical examination							0.59
Yes	220	52	109	50	111	53	
No	207	48	108	50	99	47	
Missing data	1	1	–	–	1	1	
Family history of breast cancer							0.44
Yes	79	18	41	19	38	18	
No	289	68	164	76	125	59	
Missing data	60	14	12	6	48	23	

Characteristic	n	%	n	%	n	%	p
History of mammogram							0.33
1–2 years ago	142	33	68	31	74	35	
Greater than two years ago	158	37	85	39	73	35	
Never	109	25	49	23	60	28	
Missing data	19	4	15	7	4	2	

Note. Differences between the intervention and control groups were tested using chi-square and Fisher's exact tests for categorical variables and t tests for continuous variables.

Note. Because of rounding, percentages may not total 100.

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Table 2

Comparison in Mammography Uptake

	Overall		Control[a]		Intervention[b]	
Time	**n**	**%**	**n**	**%**	**n**	**%**
6 months*	112	27	41	20	71	35
15 months**	192	49	83	42	109	56

* p = 0.0005, N = 414;

** p = 0.004, N = 395

[a] At 6 months, n = 210; at 15 months, n = 200

[b] At 6 months, n = 204; at 15 months, n = 195

Note. Differences between intervention and control groups were tested using chi-square tests.

Table 3

Logistic Model for Mammography Uptake at 15 Months Postintervention (N= 395)

Variable	Unadjusted OR [95% CI]	Adjusted OR [95% CI]
Intervention group	1.79 [1.20, 2.65]***	2.04 [1.26, 3.31]***
Age	1.03 [1.00, 1.05]**	1 [0.98, 1.03]
High school degree	1.11 [0.74, 1.66]	–
Employed	0.71 [0.47, 1.08]	–
Level of acculturation	1.51 [0.75, 3]	–
Usual source of care	3.66 [2.41, 5.56]****	3.53 [1.93,6.44]****
Physical examination	2.48 [1.66, 3.71]****	0.88 [0.49, 1.58]
Family history of breast cancer	1.22 [0.73, 2.03]	–
History of mammogram	–	–
1–2 years ago versus never	3.69 [2.12, 6.42]****	2.71 [1.41, 5.18]***
Greater than two years ago versus never	1.66 [0.97, 2.84]*	1.27 [0.68, 2.38]

* $p < 0.1$;

** $p < 0.05$;

*** $p < 0.01$;

**** $p < 0.001$

CI—confidence interval; OR—odds ratio